Claims:

1. A micro-optical grid structure (G) produced on a substrate (S), said grid structure being produced as a surface structure, a structure protected with a protective layer, or as an entirely or partially buried structure, **characterized** in that said grid structure (G) is arranged to produce for a viewer a holographic or a corresponding visual effect based on the diffraction of light by directing the light diffracted from the grid structure (G) and corresponding to the design wavelength (λ) substantially to only a few diffraction orders (m), wherein each single diffraction order (m) corresponds to a certain observing direction (m,β) of the visual effect observable at said design wavelength (λ), and the grid structure (G) is arranged to leave a free range of angles between adjacent observing directions, such that the grid structure (G) being examined from directions corresponding to said range of angles does not produce for the viewer a clearly observable effect based on diffraction, said grid structure being thus essentially transparent.

2. The grid structure (G) according to claim 1, **characterized** in that the ratio of the grid period (d) of the grid structure (G) to the design wavelength (λ) is smaller than 5.

3. The grid structure (G) according to claim 1 or 2, **characterized** in that the grid structure (G) is arranged to direct the light diffracted therefrom substantially in only one diffraction order (m), i.e. substantially in only one observing direction (m,β) that preferably corresponds to the diffraction order m = -1.

4. The grid structure (G) according to any of the preceding claims, **characterized** in that the free range of angles between the observing directions (m,β) of the grid structure (G) is at least 10-15° or larger.

5. The grid structure (G) according to any of the preceding claims, **characterized** in that the grid structure (G) is produced on a substantially transparent substrate (S).

6. The grid structure (G) according to claim 5, **characterized** in that said substrate (S) is made of plastic or lacquer, preferably of a plastic film or a lacquer layer.

7. The grid structure (G) according to any of the preceding claims 1 to 6, **characterized** in that the grid structure (G) is produced on paper, paperboard or other corresponding substrate (S).

8. The grid structure (G) according to any of the preceding claims, **characterized** in that the substrate (S) of the grid structure (G) comprises one or several dielectric or metal-based thin film coating on the entire surface area of the substrate or only at the locations corresponding to the grid structure (G).

9. A method for producing a micro-optical grid structure (G) on a substrate (S), said grid structure being produced as a surface structure, a structure protected with a protective layer, or as an entirely or partially buried structure, **characterized** in that the shape of the grid profile of the grid structure (G) producing for a viewer a holographic or corresponding visual effect based on the diffraction of light together with the grid parameters (d, h, c, n_S) are selected such that the light diffracted from the grid structure (G) and corresponding to the design wavelength (λ) is directed substantially to only a few diffraction orders (m), wherein each single diffraction order (m) corresponds to a certain observing direction (m,b) of the visual effect observed at said design wavelength (λ) and that a free range of angles remains between adjacent observing directions, such that the grid structure (G) being examined from directions corresponding to said range of angles does not produce for the viewer a clearly observable effect based on diffraction, said grid structure being thus substantially transparent.

10. The method according to claim 9, **characterized** in that the value of the incidence angle (α) of light impinging upon the grid structure (G) at the design wavelength (λ) is fixed, and the ratio of the grid period (d) and the design wavelength (λ) is selected such that at least one desired observing direction (m,β) is attained, said observing direction

being preferably selected so that it corresponds to the diffraction order m = - 1, wherein the desired design wavelength (λ) is diffracted to said at least one observing direction.

11. The method according to claim 9 or 10, **characterized** in that the parameters (d, h, c, n_S) of the grid structure (G) are selected in such a manner that the minimum free range of angles between the observing directions (m,β) is 10-15°.

12. The method according to any of the preceding claims 9 to 11, **characterized** in that the value selected for the ratio between the grid period (d) of the grid structure (G) and the design wavelength (λ) is smaller than 5.

13. The method according to any of the preceding claims 9 to 12, **characterized** in that the diffraction efficiency to said one or several observing directions (m,β) is affected by the selection of the parameters (d, h, c, n_S) of the grid structure (G).

14. The method according to any of the preceding claims 9 to 13, **characterized** in that substantially half of the value of the grid period (d) is selected as the value of the filling factor (c) of the grid.

15. The method according to any of the preceding claims 9 to 14, **characterized** in that substantially one quarter of the value of the design wavelength (λ) is selected as the value of the height (h) of the grid profile.

16. The method according to any of the preceding claims 9 to 15, **characterized** in that a substantially transparent material, preferably plastic, lacquer or the like is selected as the substrate (S) of the grid structure.

17. A product containing one or several a visual, holographic, or corresponding effects based on the diffraction of light, **characterized** in that the product comprises one or several pattern areas (A, B, C, D),

which single pattern area is formed of grid structure (G) according to any of the preceding claims 1 to 8 or produced by means of the method according to any of the claims 9 to 16.

18. The product according to claim 17, **characterized** in that the product is made of plastic, preferably of a plastic film.

19. The product according to claim 17, **characterized** in that the product is made of paper, paperboard or a corresponding material.

20. The product according to any of the preceding claims 17 to 19, **characterized** in that the product is of packing material.

21. The product according to any of the preceding claims 17 to 19, **characterized** in that the product is a printed product.

22. The product according to any of the preceding claims 17 to 21, **characterized** in that the product is made of substantially transparent material.

23. The product according to any of the preceding claims 17 to 22, **characterized** in that the basic material of said product at the same time acts as the substrate (S) of the grid structure (G).

24. The product according to any of the claims 17 to 23, **characterized** in that when the product comprises several pattern areas (A, B, C, D), at least some of said pattern areas have different observing directions (m,β) and/or design wavelengths (λ).

25. The product according to any of the preceding claims 17 to 24, **characterized** in that said one or several pattern areas (A, B, C, D) are formed on the product by means of the embossing technique.

26. The product according to any of the preceding claims 17 to 25, **characterized** in that said one or several pattern areas (A, B, C, D) form as an effect a trademark, a logo, a product description or the like.

27. The product according to any of the preceding claims 17 to 26, **characterized** in that said one or several pattern areas (A, B, C, D) are form as an effect characters or text.

28. The product according to any of the preceding claims 17 to 27, **characterized** in that the product comprises several adjacent pattern areas (A, B, C, D) that are similar to each other and that are arranged to form together a larger area with a substantially uniform visual effect.